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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 15

Application Number: 10/092,363
Filing Date: March 05, 2002
Appellant(s): LEGALLO, YANN

Anna M. Shih
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1/29/2004.

A statement identifying the real party in interest is contained in the brief.

A statement identifying the related appeals and interferences, which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

The statement of the status of the claims contained in the brief is correct.

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

The summary of invention contained in the brief is correct.

The appellant's statement of the issues in the brief is correct.

Appellant's brief includes a statement that claims 1, 4, and 16 do not stand or fall together but fails to provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

The copy of the appealed claims contained in the Appendix to the brief is correct.

DE 19847080 A1	Sesselmann	4/2000

Arguments:

Claims 1, 4, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by German patent to Sesselmann (19847080). As shown in Figure 3, Sesselmann discloses an apparatus and method thereof comprising a window glass (1), a sliding member (2, 41, and 42), a cable (5), a motor (10), an end stop (24) operatively coupled to the cable (5), and a sensor (36) disposed between the end stop (24) and the sliding member (2, 41, and 42), wherein the sensor (36) measures tension in the cable (5) and sends a signal representing "trapping" by the window glass (1).

It appears that the applicant's arguments are more limiting than that of the claims. Furthermore, the applicant states that "an end stop operatively coupled to the cable". Sasselmann discloses this limitation in that the cable is "operatively coupled" (as seen from the cable extending therethrough) to the end stop. On pages 18-20 of the English translated version of the German patent to Sesselmann, the end stop as shown in figure 3 (element 24) still reads on the applicant's claimed invention. Furthermore, even if the applicant were correct in stating that the cable of Sesselmann did "move" through the end stop (24), this still would not constitute the element of Sesselmann from being called an end stop. Still furthermore, all of the embodiments of Sesselmann discloses some sort of end stop attached to the cable. Claim 4 still reads on Sesselmann and more specifically as described on page 11, 3rd and 4th paragraphs describe this limitation in detail. With respect to claim 16, the method for determining entrapment is disclosed in the apparatus and elements as discussed in detail above and in the translated version of the German patent to Sesselmann.

In conclusion:

Claims 5-15 are allowable.

Claims 17-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1, 4, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by German patent to Sesselmann (19847080).

Any inquiry concerning this communication should be directed to Jerry Redman at telephone number 703-308-2120.

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PTO 04-0558

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ANTI-PINCH SYSTEM
[Einklemmschutzsystem]

Helmut Sesselmann

UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C. November 2003

Translated by: FLS, Inc.

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INVENTOR	(72)	: SESSELMANN, HELMUT
APPLICANT	(71)	: BROSE FAHRZEUGTEILE GMBH & CO. KG
TITLE:	(54)	: ANTI-PINCH SYSTEM
FOREIGN TITLE	[54A]	: EINKLEMMSCHUTZSYSTEM

Description /1*

The invention relates to an anti-pinch system for parts of motor vehicles that are moved by a motorized mechanism via a flexible traction means that are chucked between its ends in accordance with the preamble of Patent Claim 1.

Thus, in particular, this concerns an anti-pinch system for movable contrivances, the drive unit of which is coupled with the moving part, so that it moves along with it.

This anti-pinch device, for instance, is appropriate for cable window winders with a firmly chucked flexible cable which wraps around a cable drum that is connected with a drive motor. With this type of window winder, the propulsive power of the motor is transformed into a movement of the motor itself along the displacement direction of the window, whereas the window, in turn, is connected with the motor.

For safety reasons, displacement facilities of the mentioned type are equipped with an anti-pinch system, in order to prevent a part of the body from getting pinched between the moving displaced part and a stationary engineering component. Such anti-pinch systems have been realized in a multitude of diverse variants.

Thus, from US-PS 5,404,673, an anti-pinch system is known to the art for a window winder that, to detect a pinching incident, is required to determine both the rotational speed of the driving motor of the window winder and of the movement of the window itself. To determine the motor's

*Number in the margin indicates column in the foreign text.

rotational speed, a hall sensor can be used, in particular. A comparatively high electronic expenditure is connected with the realization of this anti-pinch system.

From US-PS 5,459,962, an anti-pinch system is known to the art for a window winder which includes a contact strip that is provided in the area of the window seal. If an object is pinched between the top edge of the closing window and the window seal, the contact strip becomes deformed as a result of the pinching force, whereby an electrical contact is closed and an appropriate electrical signal is generated. In particular, this anti-pinch system has the disadvantage that the contact strip must extend along the entire window seal in order to securely detect a pinching incident.

E 0318345A1 describes an anti-pinch system which includes means to determine the torque of a rotating gear element of the driving device of the displacement system. A pinching incident can be recognized by means of an abnormal change of the torque.

An electrically driven window winder is known to the art from DE-PS 1,082,157 the driving motor of which, being combined in one unit with the displacement gearing, is resiliently set on a stationary part of the vehicle in a straight direction of movement, whereas the motor carries a contact element of a contact pair, the counter piece of which is attached to a stationary part of the vehicle. In the event that a pinching incident occurs, increased displacement forces occur in the area of the displacement gearing and the motor which lead to a movement of the motor

and, thus, to a closure of the contact. This anti-pinch system requires an elaborate spring-loaded bedding of the entire motor-gearing unit.

The invention is based on the objective of creating an anti-pinch system which is particularly appropriate for recognizing pinching incidents in displacement mechanisms in which a moving part is moved /2 by means of a flexible traction means, and that, compared to the familiar anti-pinch systems, distinguishes itself through simple and inexpensive engineering.

This objective is realized by creating an anti-pinch system by means of the traction force which acts upon the traction means.

The increase of the displacing force in the event of a pinching incident is accompanied by the increase of the forces acting upon the traction means which transfer the displacing force from the drive motor to the moving part. These forces can be determined reliably with simple means.

As a whole, an economical and robust anti-pinch system is created with the solution in accordance with the invention which is particularly appropriate, but not solely appropriate, for displacement systems with a firmly chucked traction means.

The mechanism for determining a case in which pinching occurs is preferably directly coupled with the traction means or a component that is moved by the traction means. As a result, the force acting upon the traction means can be directly evaluated and a pinching incident can be detected.

To determine the force acting upon the traction means, the mechanism for detecting the pinching incident may exhibit an element which is deformed under the effect of the traction force which is coupled with the traction means. A pinching incident can, for instance, be detected in that the deformation of this element exceeds a predefinable value along, at least, one spatial direction due to the forces which act on the traction means.

The deformable element provided may be a spring that is stationarily chucked on one side and on which the traction force acting at the traction means acts. However, instead of a stationary support of the spring element, the provision may be that the spring element supports itself on the moving part.

In this process, the traction means preferably acts upon the spring element via a component that is connected with the traction means which may, in particular, be configured as a pressure spring (e.g., screw spring).

The pretensioned spring element may also simultaneously serve to damp the drive of the displacement mechanism. As a result, the damping means which are usually provided in the motor or in the gearing can be eliminated. Furthermore, the damping element may also serve as longitudinal compensation to compensate for changes of the traction means in the operation of the displacement system.

The signal required for the activation of the anti-pinch system may, for instance, be triggered by triggering an electrical contact through a deformation of the spring element or similar.

Apart from the above-described deformable element, other sensors are also conceivable, however, with which the force acting upon the traction means can be determined.

For this purpose, a pressure sensor may be used which is provided between the traction means and a component which forms a rest surface for the component that constitutes the traction means, such as, e.g., a pressure sensor which is provided on the surface of a deflection element for the traction means.

Furthermore, the sensor may be configured as a stretch measuring element, or as a twist measuring element, with which the stretch or the twisting of the traction means due to great traction forces can be detected.

It is of great significance that the anti-pinch system is deactivated if the moving part has reached a seal area (e.g., the window seal in the case of a window) into which the moving part is to be driven. This /3
is due to the fact that, to drive it into a seal, a traction force may be required that is comparable to the traction forces which arise in the event of pinching incidents.

Therefore, in a preferred configuration of the invention, means are provided which prevent an activation of the anti-pinch system if the moving

part is located beyond a predefinable point of the displacement path that is traveled by it.

The means for the deactivation of the anti-pinch system may include a sensor which is in an active connection with a component that is moved by the traction means. Specifically, the sensor itself can be moved by the traction means and when a predefinable point of the displacement path is reached, it can generate a signal to deactivate the anti-pinch system.

The sensor may encompass a switch contact which is driven against a catch stop when the mentioned point is reached, whereby the switch contact is closed and the anti-pinch system is deactivated.

Alternatively, the means for the deactivation of the anti-pinch system may include an interruption element which is moved by the traction means, and which acts upon the device for detecting a pinching incident when the predefinable point of the displacement path is reached, and deactivates it.

Thus, the interruption element may be a mechanical component which prevents an electrical contact from closing when the predefinable point is reached that would trigger the anti-pinch system.

To create a certain redundance, the occurrence of a pinching incident may also additionally be reviewed by means of an evaluation of the change of the motor current over time. A sudden pronounced increase of the motor current indicates a pinching incident.

If the occurrence of a pinching incident is indicated by the system for the detection of pinching incidents in accordance with the invention

without a rise in the current being observed at the drive motor of the displacement mechanism, this points to a defect of the anti-pinch system.

In that case, the function "start of a defined displacement position after pressing a button once" (e.g., complete closure of the window upon pressing a button once) is blocked for safety reasons, so that the displacement part can only be operated through a continuous operation of the appropriate switch. In this case, the occurrence of a pinching incident can only be caused intentionally any more.

In order to displace an icy window in the winter, for instance, means are provided for the manual deactivation of the anti-pinch system during one single displacement process.

It is also significant that the anti-pinch system can differentiate between so-called static traction forces acting upon the traction means which arise when the moving part runs against an obstacle and so-called dynamic forces which occur when traveling on a bumpy road, for instance.

For this purpose, means may be provided for the detection of vibrations of the displacement part and/or of its acceleration in the displacement direction that are coupled with an electronic unit which acts upon the drive motor of the moving part. These means for the detection of vibrations and/or the acceleration of the moving part may selectively catch on the traction means or on a component that is moved by the /4
traction means. So, an acceleration sensor that is stalled on a component which is stationary in relation to the displacement movement is particularly appropriate.

The anti-pinch system in accordance with the invention is particularly suitable for use with electrically adjustable window winders in which the traction means that are coupled with a drive motor is firmly chucked and in which the drive motor itself is moved along the displacement direction of the window.

Above all, a cable or toothed belt are options as traction means.

Additional advantages of the invention are revealed by the following description of configuration examples by means of the drawing.

Shown are:

Figure 1 depicts a cable window winder with a first configuration example of the anti-pinch system in accordance with the invention;

Figures 2a -2c depict the cable window winder in accordance with Fig. 1 in various displacement positions;

Figure 3 depicts a cable window winder with a second configuration example of the anti-pinch system in accordance with the invention;

Figure 4 depicts a cable window winder with a third configuration example of the anti-pinch system in accordance with the invention.

Figure 1 schematically depicts a window winder for displacing a window (1) in a motor vehicle.

An electric motor (10) that is connected to a drive housing (11) which retains a displacement gearing that is coupled with the drive motor (11) serves to drive the window winder. At its upper end, the drive housing exhibits two brackets (41, 42) via which the drive housing (11) is connected with the window (1) in the area of the window's bottom edge (3). Bolts (2) which are guided through appropriate bores of the window (1) in a familiar manner serve as connecting means.

The drive motor (10) drives a cable drum (12) via the displacement gearing that is arranged inside the drive housing (11).

The cable section below the cable drum (12) is guided around a cable deflection piece (15) to a cable eyelet (60) for the bottom end (6) of the cable. The bottom cable eyelet (60) includes a guide element (64) which is carried in a guide channel (63) in a sliding manner, and which serves to retain the bottom end (6) of the cable.

The guide piece (64) resiliently supports itself on the deflector element (15) via a screw spring (61). The spring (61) has a lesser error constant than the spring (21), which is described in the following text, which is provided in the top section of the cable (5), and is of service in the so-called cable length compensation. That means that changes of the length of the cable (5) are to be compensated with the spring (61) which occur due to wear and tear in the long-term use of the window winder.

The cable section extending above the cable drum (12) is guided to an upper cable eye (20) via an upper deflector element (14) which simultaneously serves as a device for recognizing a pinching incident.

This system includes a guide piece (24) which is carried in a guide channel (23) in a sliding fashion, and that is supported against the upper cable deflector element (14) via a pretensioned screw spring (21). A contact element (26) respectively is provided at the cable deflector element (14) and the guide piece (24) in such a way that the two contact elements (26) form a sensor (25).

This sensor (25) generates a signal if a force (F) acts on the cable section above the cable drum (12) in the direction towards the cable /5
drum (12) which is sufficiently great to compress the screw spring (21) so far that the two contact elements (26) of the sensor (25) are brought into contact.

The above-described system (20) to detect a pinching incident is integrated in a door module electronic system (50) which encompasses a switch block (53) with which various functional units of the vehicle door (particularly, of the window winders) can be triggered.

The facility (20) for detecting a pinching incident thus constitutes a unified component group with the door module electronic system (50) which can be coupled with additional electrical functional units (such as, e.g., the drive motor) via a male connector (51).

This component group (20, 50) is, for instance, fastened to a supporting piece of the vehicle door. A door module support frame, which is later connected with the interior door panel, is suitable as a supporting part.

The anti-pinch system represented in Figure 1 additionally includes means (31) for the deactivation of the anti-pinch system shortly before the window (1) is closed completely.

To deactivate the anti-pinch system, an interrupting element (32) is provided which is attached to the drive housing (11), and which therefore moves along with the window (1). The interrupting contact (32) is configured in such a way and attached to the drive housing (11) in such a way that it gets into the window seal between the two contact elements (26) of the sensor (25) immediately before the top edge (1) of the window (1). As a result, the interrupting element (32) prevents the closing of the two contact elements (26), so that, no pinching incident is detected when the window runs into the window seal.

Even if, when the window (1) runs into the window seal, great forces act upon the window (1) and, thus, on the cable (5), this is not categorized as a pinching incident, and the closing process is continued until the window is completely closed. The turning off of the anti-pinch system occurs immediately before the top edge of the window runs into the window seal; because as soon as the gap between the window's top edge and the window seal is sufficiently small, the pinching of an object between the window's upper edge and the window seal is no longer possible.

The interrupting element (32), preferably, is adjustably connected with the housing (11). As a result, the position of the interrupting element (32) can be exactly adjusted in such a way that the deactivation of the anti-pinch system occurs shortly before the window seal is reached.

A subsequent repeated adjustment of the interrupting element (32) may, for instance, be necessary if the length of the cable (5) has changed due to wear and tear.

The means for deactivating the anti-pinch system when the window runs into the window seal may also include a sensor instead of the mechanical interrupting element (32) which monitors how the window runs into the window seal. For this purpose, a multitude of mechanical, capacitive, inductive, magnetic, or optical sensors are options. A configuration example in this regard will be described by means of Figure 3 further below.

In the following text, the function of the anti-pinch system will be explained in greater detail by means of Figures 2a to 2c. /6

For reasons of clarity, the door module's electronic system (50) was not shown in Figs. 2a to 2c, respectively. In these figures, the behavior of the system (20) for detecting a pinching incident is to be shown when the window (1) closes.

Figure 2a depicts an ideal closing process of the window (1) without any interferences. In this state, the cable drum (12) is rotated by the drive motor (10) via a displacement gearing of the cable drum (12) which is provided in the drive housing (11), around which the cable (5) is wound. Because the cable (5) is firmly chucked on its two ends (6, 7) and is connected with a supporting part of the vehicle door there, the rotation of the cable drum (12) causes the drive motor (10) to move together with the drive housing (11) and the window (1). If the motor (10) is put under

current in such a way during that time that the cable drum (12) rotates to the right, the window (1) is lifted up.

When the window (1) is lifted up, a force (F) acts upon the section of the cable (5) that is located above the cable drum (12) which is directed from the cable end (7) to the cable drum (12). Because the cable end (7) is retained by a guide piece (24), that is displaceably carried in a guide channel (23) which is oriented in parallel to the alignment of the upper cable section, the two contact elements (26) tend to move towards each other under the force (F). This is prevented by the screw spring (21), however, which is taken up pretensioned between the deflector piece (14) and the guide piece (24).

The spring (21) is configured in such a way that it can compensate for both the weight force of the window (1) and the frictional forces that are created when the window (1) is lifted in the normal operation, as well as a predefined excessive force. Thus, as long as the sum of the weight force of the window (1) from the frictional force (minimal frictional force) which occurs when the window (1) is lifted up, and of the excessive force which can arise under unfavorable friction conditions are below a predefined value, the screw spring (21) is compressed so far that the contact elements (26) close. Only if the excessive force becomes so great that the above-defined overall force exceeds the predefined value, the contact closes (26).

This condition is shown in Fig. 2b. The closing of the contacts (26) indicates that, when the window (1) was lifted, a pinching incident

occurred. This means that the object was pinched between the top edge of the window and the window seal. As the drive motor (10) attempts to lift the window (1) further, even against the resistance of the pinched object, the force (F) acting upon the top section of the cable (5) increases to such an extent that the spring (21) is compressed and the contacts (26) close.

Through the closure of the contacts (26), an electrical signal is generated that is evaluated by the door module's electronic system (50) and is recognized as an indicator to an individual case. Thereupon, the door module's electronic system (50) emits an appropriate signal to the drive motor (10) which thereupon reverses its rotational direction to liberate the pinched object.

Figure 2c shows how the window (1) is driven into the top window seal. In this process, sharply increased frictional forces act upon the window (1) because, as a rule, the window seal firmly presses against the top edge of the window. These frictional forces can also have the result that the screw spring (21) is compressed so far that the contact elements (26) touch. However, when the window (1) is driven into the window seal, this is prevented by the interrupting element (32) /7
which has shifted to come between the two contact elements (26).

Thus, the anti-pinch system in accordance with the invention not only facilitates a reliable detection of a pinching incident (compare Fig. 2b), but it also facilitates the window being securely driven into the upper window seal.

In this process, it is of particular advantage that the screw spring (21) can simultaneously serve as a damping means which imparts the required elasticity to the window winder system. The damping means can thereby be saved which would otherwise be provided in the displacement gearing that is coupled to the drive motor (10).

When traveling on bumpy roads, or for other reasons, vibrations can arise in the motor vehicle which also create forces on the cable (5). These "dynamic forces" amplify the "static forces" that act upon the cable (5) which are caused by the drive motor (10).

To reliably detect a pinching incident, it is necessary to separately detect the dynamic forces and to eliminate them. This is because these forces have nothing to do with any pinching incident; however, they nevertheless contribute to the overall force which acts on the cable (5).

To determine the dynamic forces which act upon the cable (5) or the window (1), an acceleration sensor or a vibration sensor may be employed, for instance. Among other things, a pressure sensor is suitable for this, the loading of which fluctuates sharply over time when vibrations occur. From this, the dynamic forces can be computed in an electronic unit and eliminated when the pinching incident is determined.

These sensors may be coupled with the cable (5) itself, or with a part that is moved by means of the cable, such as, e.g., the motor (10), the drive housing (11), or the window (1).

Apart from the above-mentioned pressure sensor, a hall sensor which is stationarily bedded and acts together with a magnet that is coupled

with the cable is appropriate, or so is a coil which includes the cable in which current pulses are induced as a result of vibrations of the cable.

If, when traveling over a pothole or similar, extremely great dynamic forces arise abruptly, the provision may be that the anti-pinch system is turned off for a short period, in order to prevent an erroneous triggering of the anti-pinch system. In this process, it may be indicated to turn the anti-pinch system on again for safety reasons, if this state persists over a prolonged period of time (for instance, more than 200 ms). Otherwise, there would be the danger that, as a result of the extremely great dynamic forces, the forces created by an actual pinching incident are superimposed, and the presence of a pinching incident is not recognized.

In the present anti-pinch system, the problem which exists in principle is that, in the event of a breakage of the spring (21), the two contacts (26) would be in continuous contact with each other. An automatic closing of the window would no longer be possible then because its movement would again be reversed due to an assumed pinching incident shortly after the window is started.

This problem can be remedied in a simple way in that the progress of the motor current is monitored when the window is lifted up; because a pinching incident must always be accompanied by a sharp increase of the motor current.

If no increase of the motor current is observed during an assumed pinching incident, this points towards a defect of the anti- /8

pinch system. In that case, the provision is that both the anti-pinch system and the function "automatic lifting of window resulting from a one-time operation of a switch" are turned off.

The window can then only be closed through a continued actuation of the appropriate switch. An accidental bringing about of a pinching incident is thereby ruled out.

Moreover, means for the deactivation of the anti-pinch system can be provided through the actuation of a switch. These means may include an interrupting element which is pivoted between the two contact elements (26) when the mentioned switch is actuated.

The deactivation of the anti-pinch system may, for instance, be required if a window is to be lifted during the winter against strong forces.

Figure 3 schematically represents a window winder with a second configuration of the anti-pinch system in accordance with the invention.

In vast part, the configuration example in accordance with Fig. 3 conforms with the configuration examples that are shown in Figs. 1 and 2. To mark identical components, the same reference symbols are used in Fig. 3 that are used in Figs. 1 and 2. In the following text, only those technical characteristics of the configuration example of Fig. 3 are explained more closely which substantiate the differences to Figs. 1 and 2.

In the present configuration example, a contact element is not provided either on the upper deflector piece (14) or on the guide piece

(24) that is connected with the upper cable end (7). The screw spring (21) which is provided between the deflector piece (14) and the guide piece (24) therefore exclusively serves as a damping means, and not for recognizing a pinching incident.

Rather, to recognize a pinching incident, a stretch measuring strip (28) is attached to the cable section above the cable drum (12). This stretch measuring strip (28) registers a stretching of the cable (5) as a result of strong forces (F) that act upon the cable (5). For this purpose, the stretch measuring strip (28) may, for instance, include a wheatstone bridge. If the upper section of the cable (5) stretches due to a force (F) which acts upon on this cable section, this stretch measuring strip generates an electrical signal which is fed to an electronic unit (17) which is connected with the drive motor (10). If the stretch of the cable (5) exceeds the force (F) which acts upon the cable (5) by a specific, predefined value, this is interpreted as a pinching incident by the electronic unit (17). In that case, the rotational direction of the drive motor is reversed to release the pinched object in the familiar manner.

Instead of the stretch measuring strip (28), other sensors may also be provided in the upper section of the cable (5), in order to detect a pinching incident: thus, an optical waveguide can be used as a sensor which is coupled to the cable (5) and the conductivity of which is changed when a stretching of the cable occurs. Furthermore, magnetic, inductive, or capacitive sensors may also be used to determine the force (F) which acts upon the cable (5) above the cable drum (12).

An additional option for the detection of a pinching incident consists of providing a pressure sensor at the position (29) on the surface of the upper deflector piece (14) which is occupied by the cable (5). The greater the traction force (F) acting upon the cable, the more strongly the cable (5) is pressed against the surface of the deflector piece (14) at position (29). This pressure can be measured by a pressure sensor, and can then be conducted to the electronic unit (17) where /9
the output signal of the pressure sensor is utilized to detect a pinching incident.

Even in the configuration example in accordance with Fig. 3, means (36) are provided to deactivate the anti-pinch system when the window (1) is driven into a window seal. Here, these means (36) include a sensor (37) which is formed by an elastic element which includes a cavity in which two electrical contacts are provided which lie opposite to one another. This sensor (37) is connected with the drive housing (11) and therefore always moves together with the drive motor (10) and the window (1).

Shortly before the window's top edge is run into the window seal (i.e., as soon as the window's top edge is still about 3 mm away from the window seal), this sensor (37) comes into contact with a catch surface (24a) of the guide piece (24) which is assigned to it. As a result, the sensor (37) is elastically deformed in such a way that the two contact elements come into contact with one another. The electrical signal which is triggered in this process is also supplied to the electronic unit (17)

which deactivates the anti-pinch system due to this signal. A secure driving of the window into the window seal is facilitated hereby, even if forces occur on the cable (5) that usually would be evaluated as an indicator of a pinching incident.

Even if the sensor (37) is realized, a multitude of additional sensor principles can be applied aside from the above-described principle. Here, the deformation of an optical waveguide can, for instance, also generate the required sensor signal. Furthermore, it is conceivable that the position of the window (1) is optically monitored. An indirect optical monitoring is also an option in which the placement of the cable (5) on the cable drum (12) is optically determined.

Figure 4 schematically shows a cable window winder with an additional variant of the anti-pinch system in accordance with the invention.

In this configuration example of the invention, the brackets (41, 42) which are molded on the drive housing (11), respectively, exhibit a slot (45 or 46) into which a bolt is stuck, respectively, which, in turn, is connected with the window. The slots (45, 46) are oriented in parallel to the direction in which the cable (5) extends. Therefore, they allow for a movement of the motor (10) and the drive housing (11) relative to the bottom edge (3) of the window (1) in the lifting direction of the window (1).

On the other hand, a spring element (22) is provided between the top edge (11a) of the drive housing (11) and the bottom edge (3) of the

window (1) which, due to the window's (1) weight, is in spring-loaded pretension relative to the surface (11a) of the drive housing (11).

Apart from the spring element (22), a sensor element (27) is provided between the surface (11a) of the drive housing (11) and the bottom edge (3) of the window. The sensor element (27) is comprised of a deformable material and exhibits a recess in which two electrical contact elements (27a) are located opposite to one another.

The spring element (22) and the sensor (27) constitute a facility to recognize a pinching incident with which a pinching incident is detected as follows:

If an object is pinched between the top edge of the window (1) and the window seal, a further driving up of the window (1) is impossible. On the other hand, the drive motor (10) remains active as before and acts upon the cable drum (12) via the displacement gearing, to rotate it. The cable (5) section which is located above the cable drum /10
(1) is thereby tensioned further and the drive motor (10), as well as the drive housing (11) are lifted up further against the pretensioning force of the spring element (22). If the force is great enough, the spring element (22) is deformed in this process in such a way that the top edge (11a) of the drive housing (11) moves towards the bottom edge (3) of the window (1) so far that the two contact elements (27a) of the sensor (27) come into contact with one another. As a result, an electrical signal is generated which is delivered to the electronic unit (17) and evaluated there.

Based on this signal, a reversal of the rotational direction of the drive motor (10) can be brought about in the familiar manner to release the pinched object.

The sensor element (27) and the required electrical lines can be attached to the window (1) in the area of its bottom edge (3) with a foil in a simple manner.

The configuration example in accordance with Fig. 4 particularly distinguishes itself in that it makes available a reliable anti-pinch system which only requires extremely little engineering space between the window and the drive housing.

In the case of a composite glass window, parts of the anti-pinch system can even be integrated in the composite glass.

The anti-pinch system in accordance with Fig. 4 can also be combined with an appropriate mechanism for deactivating the anti-pinch system when the top window edge is driven into a window seal.

All above-described variants of the anti-pinch system in accordance with the invention can be used to monitor the lowering of the window to the extent that this is necessary. For this purpose, the above-listed measures would have to be appropriately transferred to the section of the cable (5) which is located below the cable drum (12).

Moreover, the above-described anti-pinch system can also be used with displacement facilities with a movable, e.g., rotating traction means (such as, e.g., a closed cable loop).

Patent Claims

1. Anti-pinch system for moving parts of motor vehicles which are moved motor-driven via a flexible traction means which is chucked in the area of its ends with a system to detect a pinching incident through which a stopping of the movement and/or a reversal of the direction of movement of the moving part can be triggered, particularly, for window winders and sun roofs, characterized in that the presence of a pinching incident is detected by means of the traction force (F) acting upon the traction means (5).

2. Anti-pinch system in accordance with Claim 1, characterized in that a pinching incident is detected if the traction force (F) acting upon the traction means (5) exceeds a predefined value.

3. Anti-pinch system in accordance with Claim 1 or 2, characterized in that the system (20, 28, 29) for detecting a pinching incident is directly coupled with the traction means (5) and/or a component (1, 10, 11) which is moved by means of the traction means (5).

4. Anti-pinch system in accordance with any of the Claims 1 to 3, characterized in that the system (20) for detecting a pinching incident exhibits an element (21, 22) which is elastically deformable under the effect of a traction force (F) which is in an active connection /11
with the traction means (5).

5. Anti-pinch system in accordance with Claim 4, characterized in that a pinching incident is detected if the deformation of the element (21, 22) that is deformable under the effect of a traction force (F) exceeds a predefinable value along, at least, one spatial direction.

6. Anti-pinch system in accordance with Claim 4 or 5, characterized in that, to determine the traction force (F), a spring element (21, 22) is provided.

7. Anti-pinch system in accordance with Claim 6, characterized in that the spring element (21) is stationarily supported, and that the displacement force acting upon the traction means (5), at least, partially acts upon the spring element (21) as well.

9. Anti-pinch system in accordance with Claim 7 or 8, characterized in that the traction means (5) acts upon the spring element (21, 22) via a movable component (1, 11, 24) which is connected with the traction means (5).

10. Anti-pinch system in accordance with any of the Claims 6 to 9, characterized in that the spring element (21, 22) is configured as a pressure spring.

11. Anti-pinch system in accordance with Claims 7, 9, and 10, characterized in that the spring element (21) is retained between a supporting element (14), which is stationary with regard to the movement of the moving part (1), and a component (24) which is connected with the traction means (5).

12. Anti-pinch system in accordance with Claims 8 to 10, characterized in that the spring element (22) is retained between an end section (3) of the moving part (1) and a component (10, 11) which is connected with the traction means (5).

13. Anti-pinch system in accordance with any of the Claims 4 to 12, characterized in that a signal is triggered and/or the electric circuit of the driving motor (10) is interrupted with a predefinable force that acts upon the deformable element (21, 22).

14. Anti-pinch system in accordance with Claim 13, characterized in that the signal is triggered by closing an electrical contact (26, 27a).

15. Anti-pinch system in accordance with any of the Claims 1 to 3, characterized in that the traction force (F) acting upon the traction means (5) is determined by a sensor (28, 29) which is in an active connection with the traction means (5).

16. Anti-pinch system in accordance with Claim 15, characterized in that the sensor (29) is configured as a pressure sensor which is provided between the traction means (5) and a component (4) which constitutes a rest surface for the traction means (5).

17. Anti-pinch system in accordance with Claim 16, characterized in that the sensor (28) is provided on the surface of a deflector piece (14) for the traction means (5).

18. Anti-pinch system in accordance with Claim 15, characterized in that the sensor (28) is configured as a stretch measuring element with which the stretch of the traction means (5) or a part which is pretensioned by the traction means under the traction force (F) can be defined.

19. Anti-pinch system in accordance with Claim 15, /12

characterized in that the sensor is configured as a twist measuring element with which a twisting of the traction means (5) under the traction force can be determined.

20. Anti-pinch system in accordance with any of the previous Claims, characterized in that means (31, 36) are provided that deactivate the anti-pinch system if the movable part (1) is located beyond a predefinable position of the displacement path traveled by it.

21. Anti-pinch system in accordance with Claim 20, characterized in that the means (36) for deactivating the anti-pinch system encompass a sensor (37) which is in an active connection with a component (10, 11) that is movable by means of the traction means (5).

22. Anti-pinch system in accordance with Claim 21, characterized in that the sensor (37) is movable together with the drive (10, 11), and that the anti-pinch system is deactivated when the predefined position is reached.

23. Anti-pinch system in accordance with Claim 22, characterized in that the sensor (37) includes a switch contact, and that, when the predefinable position of the displacement path is reached and a catch stop (24a) is hit, so that the switch contact is closed and the anti-pinch system is deactivated.

24. Anti-pinch system in accordance with Claim 20, characterized in that the means (31) for the deactivation of the anti-pinch system includes an interrupting element (32) which is movable together with the drive (10, 11), and that, when the predefined position is reached on the

displacement path, it acts upon the system for detecting a pinching incident (20).

25. Anti-pinch system in accordance with Claims 14 and 24, characterized in that the interrupting element (32) is configured as a mechanical component which prevents a closing of the electrical contact (26) when the predefinable point of the displacement path is reached.

26. Anti-pinch system in accordance with any of the previous Claims characterized in that the presence of a pinching incident is additionally reviewed by means of an evaluation of the change of the motor current.

27. Anti-pinch system in accordance with any of the previous Claims, characterized by a means for manually deactivating the anti-pinch system during a displacement process.

28. Anti-pinch system in accordance with any of the previous Claims, characterized in that means (56) for the detection of vibrations of the moving part (1) and/or its acceleration in the displacement direction are provided that are coupled with an electronic unit (17) which acts upon the drive motor (10) of the moving part (1).

29. Anti-pinch system in accordance with Claim 28, characterized in that the means (56) for detecting vibrations and/or accelerations of the movable part (1) catch on the traction means (5) or a component (1, 10, 11, 24) which is moved by the traction means (5).

30. Anti-pinch system in accordance with Claim 29 characterized in that the means (56) for detecting the vibrations and/or the acceleration

of the movable part (1) are attached to a component (14) that is stationary with regard to the displacement movement.

31. Anti-pinch system for movable parts in motor vehicles with /13

a) a drive motor,

b) a traction means which is coupled with the drive motor and chucked between two positions,

c) means for transferring the traction force which acts upon the traction means to the movable part,

d) an anti-pinch system,

characterized by a configuration of the anti-pinch system in accordance with any of the previous Claims.

32. Displacement mechanism in accordance with Claim 31, characterized in that the moving part (1) is a window.

33. Displacement mechanism in accordance with any of the Claims 31 or 32, characterized in that the traction means (5) is configured deformable in two levels, e.g., as a cable or bead chain.

Accompanied by 6 page(s) of drawings.

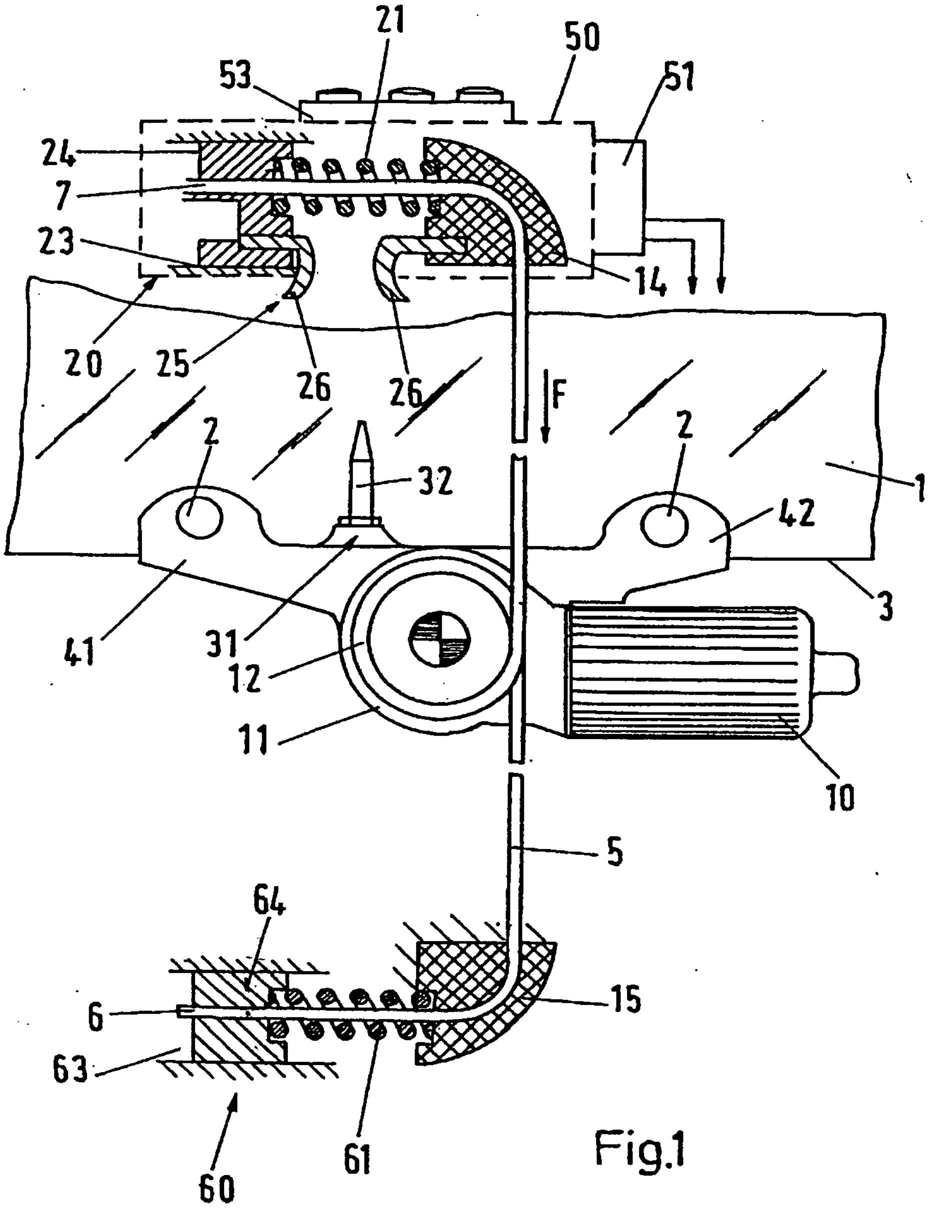
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Fig.1

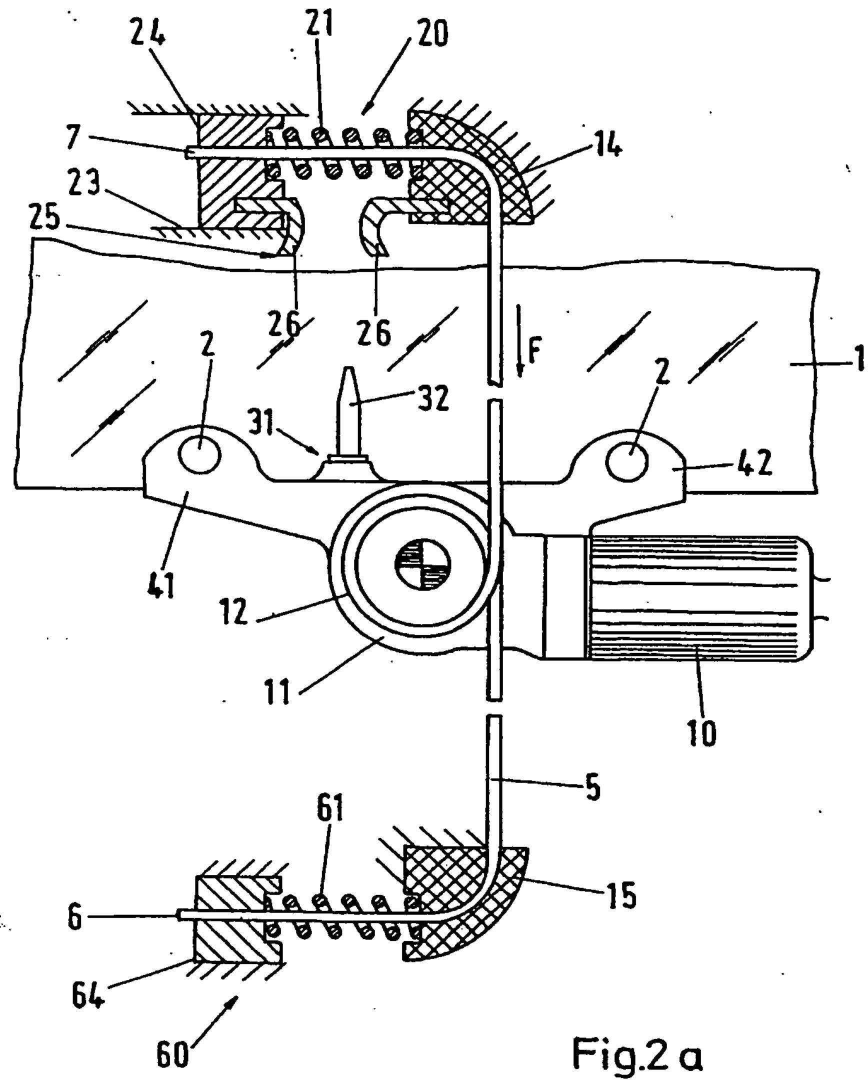


Fig.2 a

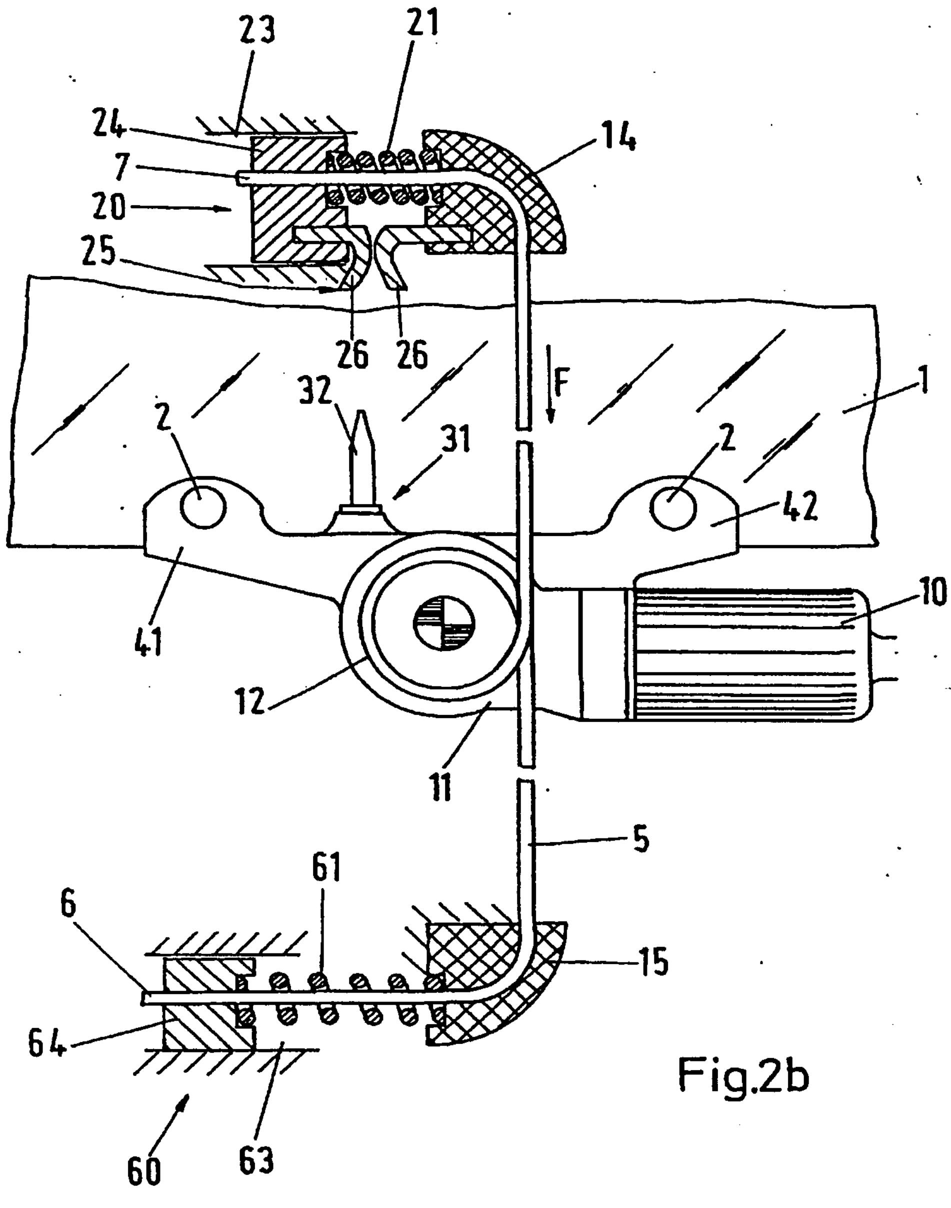


Fig.2b

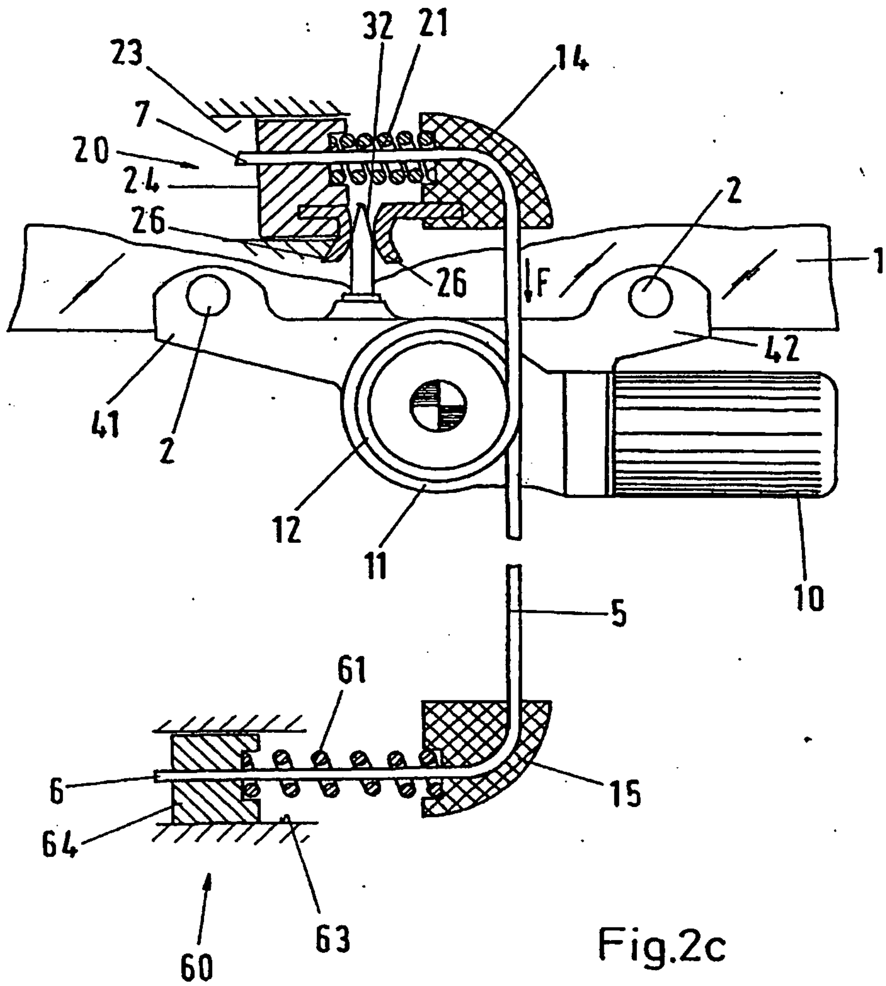
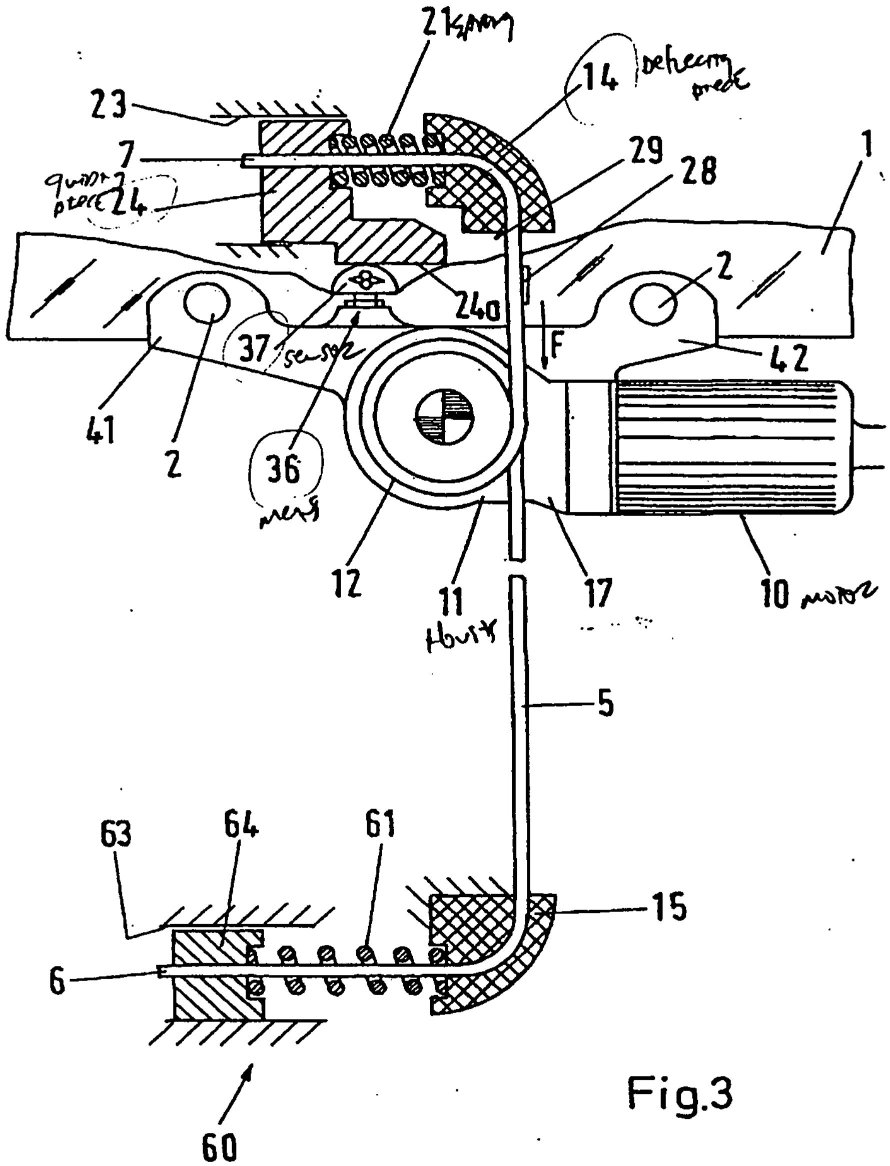


Fig.2c



21 spring
14 deflecting piece
23
7
guiding piece 24
29
28
1
2
24a
F
37 sensor
42
41
2
36 means
12
11 housing
17
10 motor
5
63
64
61
15
6
60

Fig.3

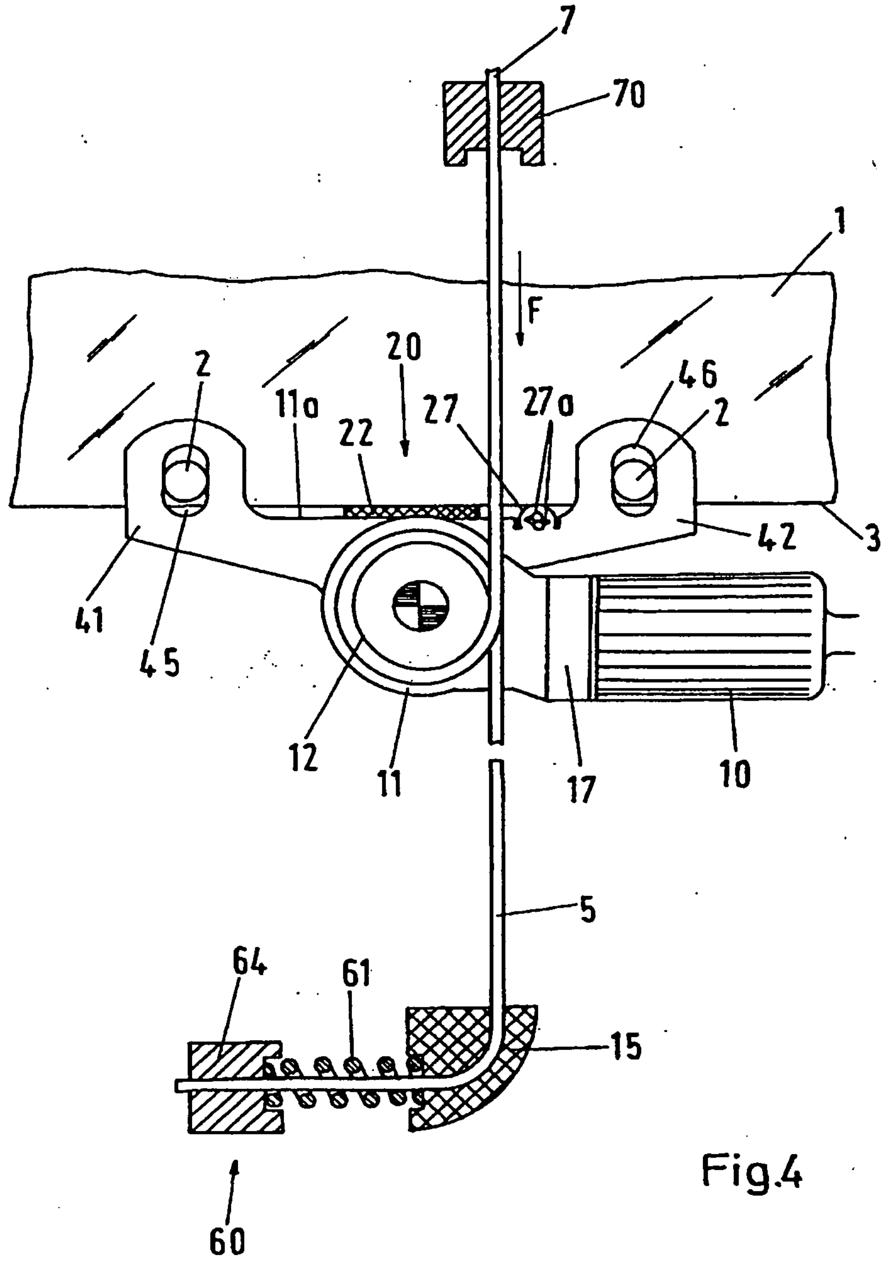


Fig.4